

CLAIMS

1. A belt type continuous variable transmission comprising

a primary sheave (29) that outputs torque,

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit torque to the secondary sheave (30) from the primary sheave (29), and

wherein the primary sheave (29) comprises.

a first sheave body (34a),

a second sheave body (34b) provided to be relatively slidable in a direction toward and away from the first sheave body (34a) and forming between it and the first sheave body (34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of push bodies (45) that rotate together with the second sheave body (34b) and move radially of the second sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), such movements causing the second sheave body (34b) to slide to change a width of the belt groove (37), and

a plurality of stoppers (66) that restrict movements of the push bodies (45) by contacting with outer surfaces (47a) of the push bodies (45) when the second sheave body (34b) reaches

a position of minimum transmission gear ratio, in which the belt groove (37) is made smallest in width, the stoppers (66) being shaped to accelerate partial wear of the outer surfaces (47a) of the push bodies (45).

2. The belt type continuous variable transmission according to claim 1, wherein the stoppers (66) are formed on the second sheave body (34b).

3. The belt type continuous variable transmission according to claim 1, wherein the push bodies (45) comprises a roller weight and at least outer peripheries thereof are lower in hardness than the stoppers (66).

4. The belt type continuous variable transmission according to any one of claims 1 to 3, wherein the respective stoppers (66) comprise a stopper surface (67) opposed to an outer surface (47a) of the push body (45) and at least one projection (68, 81, 82, 91) projecting from the stopper surface (67).

5. The belt type continuous variable transmission according to any one of claims 1 to 3, wherein the respective stoppers (66) comprise a stopper surface (100, 110) opposed to an outer surface (47a) of the push body (45), and the stopper surface (100, 110) is non-parallel to the outer surface (47a) of the push body (45).

6. The belt type continuous variable transmission according to claim 5, wherein the stopper surface (100) comprises

a curved surface (101) having a top (100a) that projects arcuately toward the outer surface (47a) of the roller weight (45), and the top (100a) of the curved surface (101) contacts with the outer surface (47a) of the push body (45).

7. The belt type continuous variable transmission according to claim 5, wherein the push bodies (45) comprise a first corner (112a) and a second corner (112b), the stopper surfaces (100) comprise a curved surface (111) being arcuately concave in opposition to the outer surface (47a) of the roller weight (45), the curved surfaces (111) comprise a first end (110a) and a second end (110b) spaced from each other, and the first and second ends (110a, 110b) contact with the first and second corners (112a, 112b) of the push body (45).

8. A belt type continuous variable transmission comprising

a primary sheave (29) that outputs torque,

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit torque to the secondary sheave (30) from the primary sheave (29), and

wherein the primary sheave (29) comprises

a first sheave body (34a),

a second sheave body (34b) provided to be relatively

slidable in a direction toward and away from the first sheave body (34a) and forming between it and the first sheave body (34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of push bodies (45) that rotate together with the second sheave body (34b) and move radially of the second sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), such movements causing the second sheave body (34b) to slide to change a diameter, at which the belt (31) is entrained about the primary sheave (29), and

a plurality of stoppers (66) that restrict movements of the push bodies (45) by contacting with outer surfaces (47a) of the push bodies (45) when the second sheave body (34b) reaches a position of minimum transmission gear ratio, in which a diameter, at which the belt (31) is entrained, is made largest, the stoppers (66) comprising at least one projection (68, 81, 82, 91) projecting toward the outer surface (47a) of the push body (45).

9. The belt type continuous variable transmission according to claim 8, wherein the push bodies (45) comprise a roller weight, and at least outer peripheries thereof are lower in hardness than the projections (68, 81, 82, 91) of the stoppers (66).

10. The belt type continuous variable transmission according to claim 1 or 8, wherein the second sheave body (34b)

comprises a plurality of cam surfaces (41), with which the push bodies (45) contact, and the stoppers (66) are positioned at ends of the cam surfaces (41).

11. The belt type continuous variable transmission according to claim 10, wherein the primary sheave (29) comprises a cam plate (43) opposed to the cam surfaces (41) of the second sheave body (34b) and rotating together with the second sheave body (34b), and the push bodies (45) are interposed between the cam surfaces (41) and the cam plate (43) and contact with the stoppers (66) and the cam plate (43) when the second sheave body (34b) reaches a position of minimum transmission gear ratio.

12. A belt type continuous variable transmission comprising

a primary sheave (29) that outputs torque,

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit torque to the secondary sheave (30) from the primary sheave (29), and

wherein the primary sheave (29) comprises

a first sheave body (34a),

a second sheave body (34b) provided to be relatively slidable in a direction toward and away from the first sheave

body (34a) and forming between it and the first sheave body (34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of roller weights (45) that rotate together with the second sheave body (34b) and move radially of the second sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), such movements causing the second sheave body (34b) to slide to change a diameter, at which the belt (31) is entrained about the primary sheave (29), and

a plurality of stoppers (66) that restrict movements of the roller weights (45) by contacting with outer surfaces (47a) of the roller weights (45) when the second sheave body (34b) reaches a position of minimum transmission gear ratio, in which a diameter, at which the belt (31) is entrained, is made largest, the stoppers (66) comprising a plurality of projections (81, 82) projecting toward the outer surface (47a) of the roller weight (45), the projections (81, 82) being spaced from each other in an axial direction of the roller weight (45).

13. A belt type continuous variable transmission comprising

a primary sheave (29) that outputs torque,

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit

torque of the primary sheave (29) to the secondary sheave (30),
and

wherein the primary sheave (29) comprises

a first sheave body (34a),

a second sheave body (34b) provided to be relatively
slidable in a direction toward and away from the first sheave
body (34a) and forming between it and the first sheave body
(34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of push bodies (45) that rotate together with
the second sheave body (34b) and move radially of the second
sheave body (34b) according to centrifugal forces generated
at the time of rotation of the second sheave body (34b), such
movements causing the second sheave body (34b) to slide to change
a width of the belt groove (37), and

a plurality of stoppers (66) that restrict movements of
the push bodies (45) when the second sheave body (34b) reaches
a position of minimum transmission gear ratio, in which the
belt groove (37) is made smallest in width, the stoppers (66)
comprising a first contact portion (120) that contacts with
the push body (45) when the second sheave body (34b) reaches
the position of minimum transmission gear ratio, and a second
contact portion (67) positioned outside of the first contact
portion (120) radially of the second sheave body (34b), the
first contact portion (120) being lower in hardness than the
push bodies (45) and the second contact portion (67).

14. The belt type continuous variable transmission according to claim 13, wherein the push bodies (45) comprise a roller weight, and at least outer peripheries thereof are lower in hardness than the second contact portions (67) of the stoppers (66).

15. The belt type continuous variable transmission according to any one of claims 1, 8, 12, and 13, wherein the belt (31) comprises a plurality of block pieces (60) and a connecting body (61) that connects the block pieces (60) together in an endless manner.

16. A power unit comprising a drive source (14) and a belt type continuous variable transmission (15) interlocking with the drive source (14),

the belt type continuous variable transmission (15) comprising a primary sheave (29) that outputs torque transmitted from the drive source (14),

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit torque to the secondary sheave (30) from the primary sheave (29), and

wherein the primary sheave (29) comprises

a first sheave body (34a),

a second sheave body (34b) provided to be relatively

slidable in a direction toward and away from the first sheave body (34a) and forming between it and the first sheave body (34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of push bodies (45) that rotate together with the second sheave body (34b) and move radially of the second sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), such movements causing the second sheave body (34b) to slide to change a width of the belt groove (37), and

a plurality of stoppers (66) that restrict movements of the push bodies (45) by contacting with outer surfaces (47a) of the push bodies (45) when the second sheave body (34b) reaches a position of minimum transmission gear ratio, in which the belt groove (37) is made smallest in width, the stoppers (66) being shaped to accelerate partial wear of the outer surfaces (47a) of the push bodies (45).

17. The belt type continuous variable transmission according to claim 16, wherein the drive source (14) comprises an engine having a crank shaft (18) and the primary sheave (34a) receives torque from the crank shaft (18) to be rotated.

18. The belt type continuous variable transmission according to claim 16 or 17, wherein the push bodies (45) comprise a roller weight and at least outer peripheries thereof are lower in hardness than the stoppers (66).

19. The belt type continuous variable transmission

according to claim 18, wherein the respective stoppers (66) comprise a stopper surface (67) opposed to an outer surface (47a) of the push body (45) and at least one projection (68, 81, 82, 91) projecting from the stopper surface (67).

20. A vehicle comprising a frame (2), a drive source (14) supported on the frame (2), and a belt type continuous variable transmission (15) interlocking with the drive source (14),

the belt type continuous variable transmission (15) comprising a primary sheave (29) that outputs torque transmitted from the drive source (14),

a secondary sheave (30) that receives torque from the primary sheave (29), and

a belt (31) entrained between the primary sheave (29) and the secondary sheave (30) in an endless manner to transmit torque to the secondary sheave (30) from the primary sheave (29), and

wherein the primary sheave (29) comprises

a first sheave body (34a),

a second sheave body (34b) provided to be relatively slidable in a direction toward and away from the first sheave body (34a) and forming between it and the first sheave body (34a) a belt groove (37), about which the belt (31) is entrained,

a plurality of push bodies (45) that rotate together with the second sheave body (34b) and move radially of the second

sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), such movements causing the second sheave body (34b) to slide to change a width of the belt groove (37), and

a plurality of stoppers (66) that restrict movements of the push bodies (45) by contacting with outer surfaces (47a) of the push bodies (45) when the second sheave body (34b) reaches a position of minimum transmission gear ratio, in which the belt groove (37) is made smallest in width, the stoppers (66) being shaped to accelerate partial wear of the outer surfaces (47a) of the push bodies (45).

21. The belt type continuous variable transmission according to claim 20, wherein the push bodies (45) comprises a roller weight and at least outer peripheries thereof are lower in hardness than the stoppers (66).

22. The belt type continuous variable transmission according to claim 21, wherein the respective stoppers (66) comprise a stopper surface (67) opposed to an outer surface (47a) of the push body (45) and at least one projection (68, 81, 82, 91) projecting from the stopper surface (67).

23. A sheave for continuous variable transmissions, comprising

a first sheave body (34a),

a second sheave body (34b) that forms between it and the first sheave body (34a) a belt groove (37), about which a belt

(31) is entrained,

the second sheave body (34b) being enabled by a push body (45), which moves radially of the second sheave body (34b) according to centrifugal forces generated at the time of rotation of the second sheave body (34b), to relatively slide in a direction toward and away from the first sheave body (34a), and comprising

a stopper (66) that restricts movements of the push body (45) by contacting with an outer surface (47a) of the push body (45) when slid to a position of minimum transmission gear ratio, in which the belt groove (37) is made smallest in width, the stopper (66) being shaped to accelerate partial wear of the outer surface (47a) of the push body (45).

24. The sheave for belt type continuous variable transmissions, according to claim 23, wherein the stopper (66) comprises a stopper surface (67) opposed to an outer surface (47a) of the push body (45) and at least one projection (68, 81, 82, 91) projecting from the stopper surface (67).

25. The sheave for belt type continuous variable transmissions, according to claim 24, wherein the stopper surface (67) and the projection (68, 81, 82, 91) are higher in hardness than the push body (45).